Origins 45

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Editorial:
‘Truth in Science’ focuses thought on the teaching of origins

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Outrage and alarm was the media greeting for the launch of the ‘Truth in Science’ initiative on 20 September 2006. Schools up and down the country were sent two DVDs with a study guide helping teachers to utilise these materials in biology lessons. Instead of welcoming a constructive and stimulating input to the educational process, the denunciations were almost universal. The BBC (1) said it was an attack on science. politics.co.uk (2) described it as “lies lies lies”. Ekklesia (described as a UK Christian think tank) and the British Humanist Association wrote a joint letter to the Government’s Education Secretary to request a high level response to keep this material away from students (3). An early day motion (No. 2708) for the House of Commons has been tabled by some backbench MPs saying that the “creationist religious group Truth in Science is full of scientific mistakes and fails to disclose the group’s creationist beliefs and objectives; and urges all schools to treat this literature with extreme caution.”

Yet, the declared aim of ‘Truth in Science’ (TiS) is to *“promote good science education in the UK.”* “We consider that it is time for students to be permitted to adopt a critical approach to Darwinism in science lessons. They should be given fair and accurate presentations of alternative views. Truth in Science promotes the critical examination of Darwinism in schools, as an important component of science education.” To most normal people, this is hardly an attack on science! Indeed, TiS sees its work as helping to implement guidelines of the National Curriculum for Key Stage 4 Science: “Pupils should be taught … how scientific controversies can arise from different ways of interpreting empirical evidence (for example, Darwin’s theory of evolution)”. Furthermoere, in a Press Release (4) on 28 September, Truth in Science reported that 16 out of 25 responses from schools were positive.

Their educational goals are explained on the website and related to the educational policies and guidelines of the UK. Teachers are provided with lesson plans which link sections of the DVDs to specific elements of the National Curriculum. Also included is an overview of educational material relevant to the key ‘icons of evolution’: including the development of biological resistance, the peppered moth, horse evolution, Darwin’s finches, the Miller-Urey experiment, and homology in vertebrate limbs.

Onlookers might wonder what the fuss is all about. Are not teachers perfectly capable of evaluating this material and deciding for themselves its relevance to their teaching? Does it really need a Government body to tell them what resources can and cannot be used? What are teachers to make of the following:

“…the Government should take care to ensure that their stated policy is known by teachers on the ground, by informing them that the resources they are being offered by this organisation are totally unsuitable.” (British Humanist Association)

“Reputable scientists and reputable theologians are clear that the anti-evolutionary ideas propagated by groups like this are in no way comparable to scientific theories of origins. The government and its inspectorate should have no truck with superstition in the modern science classroom.” (Ekklesia co-director Simon Barrow).

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Transposons: the good, the bad and the ugly

Marc Surtees

Introduction

We often think of DNA as a long chain of genes that are the blueprints of an organism. However, the results of the project to sequence the human genome show that only a small amount of DNA is needed for the actual genes that are believed to make all the proteins an organism requires. The rest of the DNA is non-coding DNA, i.e. it does not code for any known proteins. This non-coding DNA has been called junk DNA and some evolutionists believe that this is either the remnants of past evolution and / or parasitic DNA. However, many people are now finding evidence that some of the non-coding DNA has very important functions. Indeed, a lot of research suggests that this so called junk DNA is there for a very good reason and we suggest that it has or had some very useful functions. For this reason the term non-coding DNA is becoming more popular than junk DNA.

There are several types of non-coding DNA and one of the most common is transposons.

What are Transposons?

Transposons are bits of DNA that can move around chromosomes. Some are "cut and paste" and others are copied and put into a different chromosome or into a different place on the same chromosome.

The first transposons were discovered in the 1940s by Barbara McClintock who worked with maize. She found that they were responsible for a variety of types of gene mutations. The most obvious was the mutations that occur while the corn develops and produces the variegated pattern which is so prized in "Indian corn".

It took about 40 years for scientists to fully appreciate the significance of Barbara McClintock's discoveries.

We now know that transposons make up more than 50% of the maize genome. Transposons are found in the DNA of bacteria, plants and animals. More than a third of human DNA consists of transposons. The fact that transposons seem to be located in specific parts of chromosomes of both plants and animals suggests that they have functions.

Functions of Transposons

The initial characterisation of transposons as one form of junk DNA has undoubtedly slowed research into their functions. Recently, however, many functions have been proposed for transposons, ranging from control of development of the embryo to production of antibodies. Some transposons definitely have a useful function, while others appear to be less useful and some cause genetic disease.

The Good

About 10% of the maize genome is made up of many copies of one transposon and another 40% consists of other transposons. The most well known function is switching genes on and off which produces different coloured grain. However, this does not mean that there is no other function for these transposons and as more work is done on transposons to look for function we would expect to find that they are essential for the proper control of the genome at various stages of the life cycle of the plant. As maize is a very important food crop, it is interesting to think that transposons have had a role during the selective breeding that has maximised its potential as a food source.

One very interesting recent report has provided evidence that transposons have a key role to play in the control of genes in the developing embryo. (Pearston *et al* , 2004). They studied mouse eggs and early stage embryos and found that a lot of the messenger RNA is made from transposons. It is suggested that these transposons are part of the regulatory mechanisms that switch genes on and off as the fertilised egg develops into an embryo. Different transposons could possibly have a significant effect on the way genes function during the development of the new individual and contribute to biological variation. As this process occurs during early embryonic development it would not be observed later in the life of the organism. This is one reason why the evidence for transposon function has taken a long time to be published.

In some insects transposons are involved in the maintenance of DNA during cell division. Every time a cell divides each chromosome has to be copied and when this happens sequences of DNA called telomeres, which are at the ends of chromosomes, become shortened. Various mechanisms exist to extend the telomeres so that cells can keep dividing. Experiments with the fruit fly (Levis *et al,* 1993) and the silk worm (Takahashi *et al,* 1997) suggest that in these insects a type of transposon moves bits of DNA to the ends of the chromosomes, to prevent the loss of telomeres following chromosome replication.

Antibody production seems to be dependent on transposons that have a role in shuffling the genes which code for the variable region of antibodies (Agrawal, 1998). Antibodies are complex protein molecules, manufactured by white blood cells, that are part of the process by which the body fights infections. Our white blood cells produce millions of different types of antibodies and as there are only around 30000 genes in the human genome it is obvious that we do not inherit a gene for each antibody. The antibody coding genes of mature white blood cells are made up of two sections, one of which is constant and is shared by all antibodies and the other of which is variable. There are as many variable regions as there are antibodies. However, each immature white blood cell starts with the same set of three gene segments that code for the variable part of antibodies. These have been labelled V for variable, D for diversity and J for joining. The variable region of the mature white blood cell is manufactured by the recombination activating genes (RAG). The proteins produced by the RAG genes are able to cut and paste DNA from these three segments to produce an almost infinite number of combinations of different bits of the V, D and J segments, which is why this process is called V(D)J recombination. This process occurs in the white blood cell producing tissues of the embryo and without it our bodies would not be able to produce the many different antibodies we need to fight infections. Test tube experiments with the RAG proteins have shown that they cut and paste pieces of DNA in the same way as transposons. These results suggest that a fundamental component of the vertebrate immune system requires transposons, which because of their capacity for DNA rearrangement are able to produce extensive genetic variability in specific cells.

Apart from this very specific role of transposons in white blood cells, there is an increasing amount of evidence consistent with the idea that transposons are very important generators of other types of genomic changes. Kidwell and Lisch (2000) have reviewed some of the ways that transposons can rearrange chromosomes. These rearrangements mostly occur during meiosis, the process that produces gametes (eggs and sperm).

> Transposons are bits of DNA that can move around chromosomes. Some are “cut and paste” and others are copied and put into a different chromosome or into a different place on the same chromosome. “

Transposon activity has also been observed in a case of hybridisation between two species of wallaby (O’Neill R.J. *et al.* 1998). Examination of the genome of the hybrids revealed a massive increase in the number of a certain type of transposon and an associated rearrangement of the chromosomes.

It has been found that the rate of mutations due to transposons is not constant (Kidwell and Lisch, 1997). The cause of these sudden bursts of activity is not well understood but they appear to be related to inbreeding and other forms of genomic stress. This happens in plants when cell culturing techniques have been used and when plant cells become infected. Therefore, genetic variability increases when the survival of the organism is threatened. This mechanism might produce increased variability of the offspring in populations that are facing some sort of environmental challenge.

This role of transposons in the generation of genetic diversity and the fact that this can occur at a variable rate is consistent with the AGEing process proposed by Wood (2002). He has suggested that transposons, which he calls altruistic genetic elements (AGEs), were responsible for producing new species after the global flood. It is also suggested that AGEs can explain a range of biological phenomena that can not be satisfactorily explained otherwise.

The ability of transposons to produce additional copies of a gene suggests that they may have a “back up” function to prevent the loss of genetic variability. This might allow organisms to carry more than two alleles of any particular gene, while at the same time only a maximum of two alleles would be detectable by normal methods. This role of transposons is hypothetical but is consistent with the known functions of transposons.

The Bad

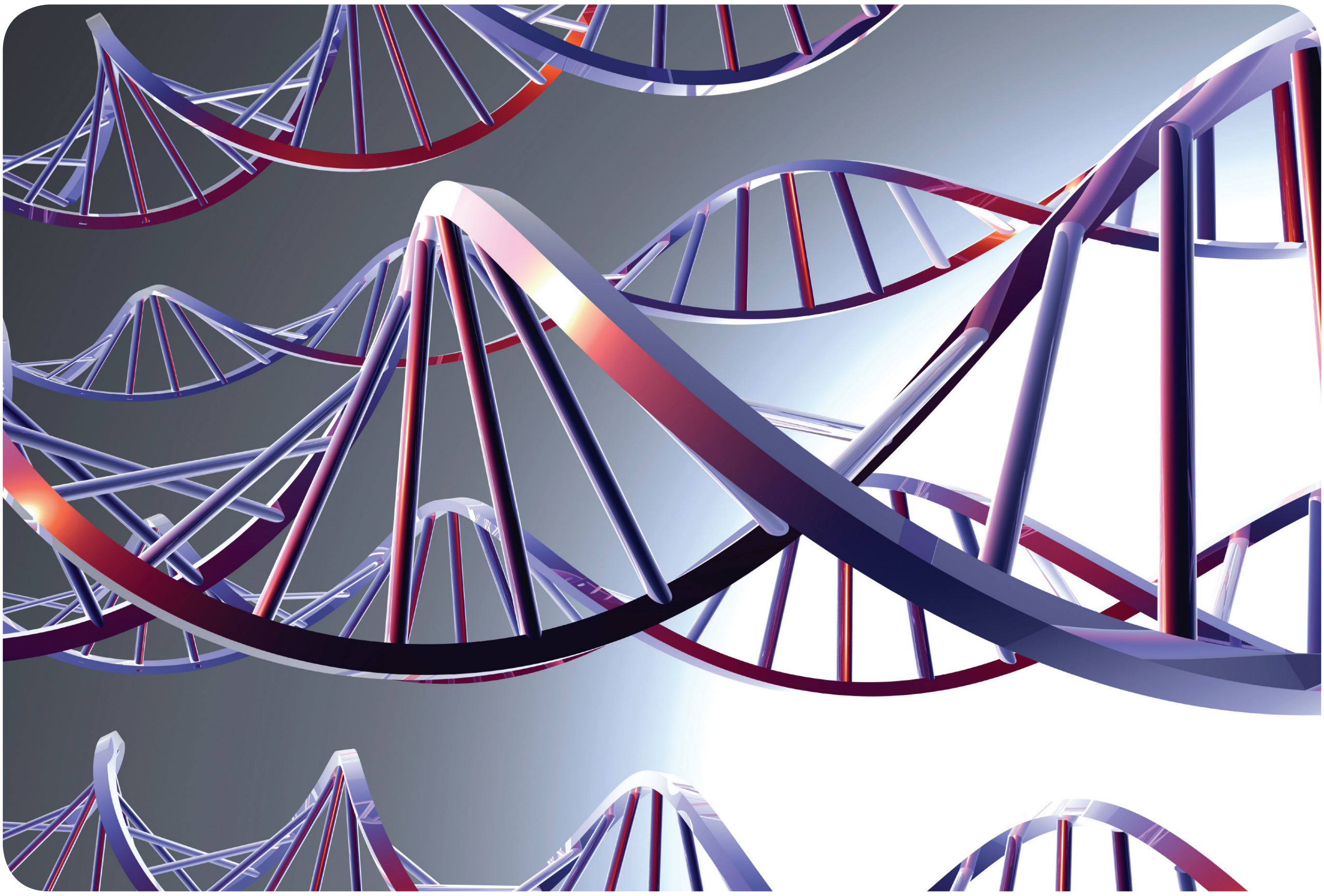
One piece of information that supports the idea that transposons may have had a role in the origin of harmful features comes from study of the genome of the Anopheles mosquito. It appears that the chromosome of this mosquito has been rearranged in ways that are consistent with the activity of transposons (Mathiopoulos K.D. *et al.* 1998). It is tempting to suggest that the annoying life style of the mosquito may have come about because of transposon induced genetic modifications.

Genetic decay appears to have made some transposons defective. Some seem to be remnants of viruses that have been permanently added to the DNA of plants and animals. These transposons have been called parasitic DNA and might be true junk DNA, the existence of which can be interpreted as one of the results of the curse rather than evidence of evolution. This type of transposon appears to be mostly harmless and there are systems that chemically modify transposons to keep them inactive. It is interesting to note that the hybridisation of wallabies (mentioned above) appears to have only been possible because this mechanism was switched off, so it may be premature to conclude that they have no useful role.

We should bear in mind that just because we do not know the function of some transposons it does not mean that they have no function. It is worth noting that the complexity of the processes that involve transposons could hardly have been imagined when they were first discovered. Indeed the evolutionary perspective of many scientists might well have discouraged research into the function of transposons. The creation paradigm, however, would indicate that transposons have or had a function. Furthermore, we would not be surprised to find that some transposons have malfunctioned, as the result of the fall of mankind.

The Ugly

Some of the transposons have been found to cause genetic disease. These are a type of transposon that functions in the same way as viruses which insert DNA into the host chromosomes. Haemophilia, high cholesterol and some forms of heart disease are all



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associated with these transposons.

Other transposons are involved in tumour formation in animal cells. There is also evidence to suggest that oncogenes (genes that cause tumours) may be activated by transposons that are copied to a position adjacent to an oncogene.

Discussion and Conclusions

It is clear from the evidence that has been accumulating over the last 10 to 15 years that transposons have very important functions. Their ability to produce genetic variation on a large scale and with an amazing degree of sophistication is a design feature that should be taken into account by scriptural biologists when trying to understand the variability of the genome. We also need to be careful to remember this when examining the theories of evolutionary genetics. Furthermore the ability of transposons to produce programmed beneficial genetic changes means that we need to move on from the paradigm that attempts to refute Darwinian evolution by stating that random point mutations only produce defects and loss of genetic information. Especially as scriptural biology needs to be able to explain the vast variety of species that has been derived from relatively few animal kinds that passed through the flood bottle neck.

The genome is an intricate information processing system that stores, modifies and transmits the information required to keep a cell functioning correctly. It is also designed to transmit that information to the next generation. Transposons are part of the system, that when functioning correctly, ensures the survival of the cell, organism and population. Defects of this system can result in no harm but can also cause devastating genetic diseases depending on the genetic networks that are affected. ■

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Arguments for Design: Language and Communication – Part Two – the 'flight' of the human tongue

Nancy Darrall

Chomsky's view on the difference between the language of trained chimps and humans was unequivocal.

> "Maybe they can jump a little higher but they can't fly."

The previous article in *Origins* 42 compared animal and human communication and we saw that chimps, like many other animals, can communicate but there is an enormous difference between animal and human communication. What does it mean to "fly" in Chomsky's metaphorical use of the term and how can we account for the origin of human language?

To gain an appreciation of the layers of complexity in human language, we will look at the building blocks, from the sounds that make up words, the words themselves and the way words are combined to convey added and more complex meaning.

Spoken language is a stream of constantly changing patterns of sound frequencies. We identify chunks of sound frequencies as 'sounds' and combinations of vowels and consonants as syllables and words. Each language includes a different subset of sounds, English has about 45. Sounds are used contrastively to build words, for example, "she" and "he" differ by one speech sound as do "teach" and "team". The sounds themselves have no meaning, for example animals don't always contain the sound "a" or snake names "s". Also the same sound combinations can mean different things as we see in homophones, e.g. 'pear' and 'pair', 'mail' and 'male'. Neither is there any blending of meaning when sounds are combined: consider the different meanings of the following words, "ta", "at", "pa". "pat", "tap". This means that an infinite possible number of meanings can be created by combining sounds to form words, unlike in many animal calls, such as the vervet monkey alarm call where the whole call is the unit of meaning. Also, the same sounds in the same order may have totally unrelated meaning in different languages, "man" in English means 'I' in Persian; "pan" in English sounds means 'Mr', 'Sir' or 'man'. The meaning of the words is totally separate from the sounds used. In fact, at every level, the components of language are quite separate from the message. This meets the criteria of design specificity.

Children who have problems recognising or using sounds to form words are difficult to understand at best and frequently open to misunderstanding and total breakdown of communication. All of us have suffered misunderstandings at times, anger and breakdown in relationships are not uncommon; incompletely formed language may be worse than no language at all. The theory of evolution must account for the selective disadvantage of such misunderstandings at a basic level, for example, warning of predators, food supplies, strategies for hunting.

At about 18 months of age, children become virtual vacuum cleaners, learning words rapidly to describe and express their world. By about 18 years of age, they have learnt about 60,000 words in a first language. With each word learnt, we store much information about it, so that we can recognise and understand it on future occasions. However, stored words are more than a pile of books on a shelf. They are organised in our mind so that we can access them by many triggers, for example the meaning, function, category, description, place of use and information about the sounds in the word. A comparison would be using a web search engine to retrieve a piece of information such as a flight departure time. Each search narrows down the amount of information until we find the required departure time. It is possible to access the same piece of information by several routes on the web. Similarly a warehouse stock control system or library retrieval system will have networks to access information. These networks are not random, they have to be designed. It is logical also to conclude that the similar organisation of language in the brain was also designed.

Image S. Patel © 2007

Words are like bricks, they are the components of sentences, but we do not build sentences like a wall, one brick at a time. Although we are usually unaware of it when we speak, we start with a structural framework and then slot in the words to express the required meaning.

Take this example from Pinker (1994)

> "He thinks John listens to music."
>
> And
>
> "When he thinks John listens to music."

How the meaning is totally altered by adding a single word at the beginning! More complicated sentences reveal even more structure. Note the dependency in the following sentence,

> "Either I catch the dog or the dog bites the child."
> The use of "either" requires a later use of "or" to complete the sentence.

Take another example from Pinker (1994)

> "Daddy, what did you bring that book that I don't want to be read to out of up for?

It is cumbersome, but grammatically correct. The child has committed to 5 necessary grammar function words by the time "read" has been spoken.

The word "what" required 'for'; "bring" required 'up'; read required 'out of' and also 'to'. These small words are spoken evidence that there is a framework around which sentences are built. If sentences were put together as beads on a string, or bricks building up a wall, there is no way that this dependency could be remembered.

Let us take a much shorter sentence.

> "The dog bit the child."

The meaning of this sentence in English is controlled by the rule that the first item is the one doing that action, the second is the action and the third the one experiencing that action. Now we can add to that sentence to develop the meaning.

> "The large dog bit the child."
>
> And
>
> "The large dog who is chained to the fence near the gate savagely bit the young child."

These longer sentences have the same structure, they have been enlarged to add meaning, but within the original framework. Around "dog" are added descriptions about this animal and there are specific rules governing where this information comes in a sentence. Similarly, there are restrictions about the place to put the additional information regarding how the dog bit the child. Try moving the words around, and you will soon be thinking 'I can't put it like that, it's wrong.' Language structure is rather like a tree. Imagine you are looking up into a tree and at first you can only see three branches. One represents 'dog' another 'bit' and another 'child'. As a general rule we can only add information in the same way as looking along each branch reveals more, smaller branches. We can imagine a sentence under construction like a tree. The words are slotted in rather like Christmas decorations hung at the tips of the branches. We choose the underlying hierarchical framework to best represent the meaning we want to convey.

Although superficially, different languages have different rules, they are merely different surface expressions of the same underlying framework of sentence building that can be found in every languages. Chomsky coined the phrase "universal grammar" to describe this. Part of the structural framework is that there are different categories of words and rules dictate their position in a sentence. We know them as verbs, nouns, adjectives, prepositions etc and these categories are found in all languages.

When we compare different languages the grammar appears superficially different because of the relative importance of three strategies to code meaning. Significantly, language rules are not arbitrary and in free variation. One of the three forms tends to dominate in any particular language. Word order is important in English and the following example shows this.

> "The dog bit the child."
> "The child bit the dog."

We depend on the ordering of words to convey meaning. We can get around this to alter the focus of the sentence but it to do so we must change the grammatical framework.

Two Girls Talking Zela © 2007

Mouth Naraosga © 2007

> "The child is being bitten by the dog."

Here the small grammar words, "is being" and "by" give us clues of the underlying structure that tells us that it is still the dog that is the culprit.

The second way languages can code meaning is by adding endings. These indicate the role each word has in the sentence and then position in the sentence is of much less importance. This is more typical of Latin and German but does occur in English. We add 's' to indicate possession as in

> "The dog's basket."

The third way is the grouping of several units to make one long word. This is known as agglutination. The word itself is one such example, literally 'ag-glutin-ation-s', another example is 'darwinianism'. We many not be able to explain the rules governing the ordering of the units but we know, for example, that 'darwiniansism' does not have an acceptable word structure. In some languages this is the most common way to encode the meaning relationships of words. "ngirruunthingapukani" in Austrialian aboriginal language Tiwi means 'I keep on eating.' (Pinker 1994)

A change in the proportion of these three features can alter a language significantly. This happened in English several hundred years ago, when many of the endings that we had inherited from the German were dropped. The language then switched so that word order became the essential feature coding meaning.

Chomsky (cited in Pinker, 1994) declared that if a Martian listened to the world's languages he would conclude that they were all the same. This is because the same restricted range of possibilities occur in languages, but just in different proportions. Many theoretical possibilities are never found. This satisfies the design criteria of complexity. More than this, features cluster together rather than being in free variation between languages. Where the word order is predominately subject, verb and then object, then words introducing phrases that answer the question "where?" are prepositions, whereas where the word order is predominately subject, object and then verb, postpositions are used in phrase answering the question "Where?".

> Although superficially, different languages have different rules, they are merely different surface expressions of the same underlying framework of sentence building that can be found in every languages. Chomsky coined the phrase "universal grammar" to describe this.

There is yet another layer to the complexity of language, known as pragmatics. This is the equivalent of 'reading between the lines' when we listen to someone else talking and understanding what is implied. In turn, it also includes the skills at conveying information in the manner appropriate to the situation.

For example, if I say to someone "I'm really thirsty." The implied meaning is that I hope she or he will offer me something to drink even though I have not said as much. If he or she ignores the comment and continues talking about something else, I may need to understand that they have a pressing problem that they need to share and I should wait before repeating my request. Errors in understanding this level of language are common in people with Asperger's Syndrome and can lead to complete breakdown in communication even when they can construct the sounds words and grammar of language competently.

So then, has language evolved? It is said that English has 'evolved' from a German grammar and a French vocabulary. However, this only amounts to a re-arrangements of the pre-existing features. It is the same as taking a pack of cards and dealing a hand, and later reshuffling and dealing a different hand from the same set. Nothing new, just a re-assortment. The challenge is to account for the origin of human language *de novo*. How did language grammar, with all the interlinking language rules and structure first appear? How can we explain the limited range of options utilised to express those underlying rules in natural languages. How did the vocabulary storage and access system arise? How is it that word meaning and speech sounds are only arbitrarily associated? The many layers of complexity together with a hierarchical organisation of components rule out a chance origin of sentence design. For example, chance changes might be responsible for generating a simple chaining device but cannot make a sentence where one word is dependent on another somewhere else in that same sentence. Human language allows for the expression of an infinite range of meanings and a plethora of alternative ways to express the same meaning. Look also at the use of idioms and metaphor, sarcasm, story-telling, poetry. In addition, casual observation of language shows that evolutionary selection is at a loss to account for the complexity and range of communication in terms of selective advantage for survival. Consider the depth of aesthetic, philosophical and theological discussions possible using language, hardly of selective advantage in evolutionary terms!

Attempts have been made to describe how language could have evolved by learning and gradual accumulation of features and complexity of those features by natural selection, e.g. Nowak and Komarova (2001). They do consider the need for both speaker and listener to evolve the same communication system at the same time, but they model only very basic language and take no account of the negative effects of miscommunication.

Chomsky argues that the logic of language must be 'wired into' children rather than learnt because of the speed of acquiring such complexity of language without formal instruction. They, like adults, combine words in ways that they have never heard before, to express feelings, plans, needs and the multitude of sentiments that effortlessly pour from our mouths. Chomsky coined the phrase 'language acquisition device" because the skills needed are specific to language and develop differently from those used across other cognitive functions (see a commentary on the Piaget-Chomsky debate on language and learning; Piattelli-Palmarini, 1994) . This excludes suggestions that language could have evolved from a general learning process which became quicker as mutations emerged that allowed development of a specific language skills.

Much learning is certainly involved in acquiring our first language, for example, the speech sounds of our own language, the correct grammar and vocabulary. Many features are likely to involve a combination of innate structures and language specific learning processes (Bishop, 1997; Redington and Chater, 1998; Tomasello, 2000).

We have learnt much about innate language skills from children who find it difficult to acquire their first language (Bishop 1992). There can be specific areas of weakness that do benefit from focussed therapy and much practice. The disability often runs in families and evidence is emerging of underlying gene mutation(s) in some cases. Speech and Language Therapists know the condition as Specific Language Impairment and many of these children have normal IQ levels, others are extremely clever, with IQ levels of 130 known. Remaining brain functions seem entirely intact, pointing at damage or malformation or malfunction in a very specific part of the brain. Further, brain scans of stroke patients who have difficulties understanding or using spoken language pin-point specific areas of damage. This gives evidence of localisation of language function in particular areas of the brain. Broadly speaking, Wernicke's area is responsible for the understanding of language and Broca's area enables us to say things.

Much learning is certainly involved in acquiring our first language, for example, the speech sounds of our own language, the correct grammar and vocabulary. Many features are likely to involve a combination of innate structures and language specific learning processes.

(Bishop, 1997; Redington and Chater, 1998; Tomasello, 2000)

Creole languages powerfully demonstrate the inbuilt capacity to acquire language. In Hawaii there was an influx of people from many parts of the world, China, Japan, Korea, the Philippines, Portugal and Puerto Rico to work in the sugar plantations. Quickly, a pidgin developed in which people relied on the words and the context to understand what was said. One example quoted by Bickerton (1981) is a case in point.

> "Me cape buy, me cheque make."

The man was previously a coffee farmer and was talking about selling his crop. However, because of the absence of grammatical structure in the pidgin, we cannot be sure of the meaning from the words alone. Was he buying the coffee or selling it? Should the first "me" be translated into English as 'I' or as 'my'? We cannot tell!

In contrast, the children who grew up on Hawaii spoken what is termed a creole, with a standardised word order grammatical markers, auxiliaries, pronouns, prepositions and case markers. Interestingly, the grammar was very similar to that of other creoles developed from unrelated languages in other places around the world. This is a clear pointer to an innate underlying blueprint for language.

Baby Ear jynmeyer © 2007 sxc.hu

Another example is Nicaraguan Sign Language, ISN. Deaf children from all over Nicaraguan were first brought together in a deaf school about 35 years ago. At home, they used some natural gesture but at the school they started spontaneously signing to each other. Older children developed a pigeon language, but younger children developed a grammatical structure so that they could communicate unambiguously as in any other language (Helmuth, 2001, Senghas *et al,* 2004). This difference between younger and older children is telling. Something is active the minds of younger children to develop language, whether their native tongue, a rapid acquisition of a second language or as happened here, a new language. You could say that they 'created' a language. However, it would be in the same way that we could 'create' a prefabricated house from a kit that could be put together in a number of different ways. The creation was theirs, but the framework and plan was already present in their "language acquisition device".

We can think of speaking and listening as two ends of a chain. To succeed, each component must be present and able to interact with the links before and afterwards. If we hear someone speak to us, then our hearing must be functioning well and at the right sound frequencies to detect speech sounds. The auditory nerve must then be functional to carry the message intact and then the auditory processing functions of the brain able to distinguish between the speech sounds and process in sequential order. Similarly, the language processing functions of the brain must be able to recognise the words, sentence structure and pragmatics to analyse the message and finally the central cognitive functions must understand the message. To complete the speech chain a reply is needed. We must decide what to say, the sentence framework must be decided. Then we must retrieve the words we need from store and slot them into the sentence framework. After that, the associated speech sounds must be retrieved together with the instructions for production and sequencing of the sounds. Finally messages must sent through the nerves to activate the muscles of the lungs, voice box and mouth to provide the movement to make the sounds. (ref for sentence processing models). This chain of events must necessarily be complete to be functional. (Garrett, 1975, Stackhouse and Wells, 1997 Chiat, 2000) Many of the individual processes are themselves complex, and certainly the whole chain of events from listening to speaking is irreducibly complex, each part is necessary for the message to be conveyed.

The anatomical and neurological chain of events in understanding and producing human language are similarly complex. True, the ear, brain and mouth are involved in hearing and producing non-language sounds, but the different requirements to process speech sounds are multiple and complex.. If we compare chimps and humans, many adaptations would be required, as well as entirely new structures, all of which must be in place and entirely compatible, for successful speech and language. Examples would be the need for adjustments in hearing acuity for human speech to the range of 500 Hz to 4,000 KHz and the exacting and extremely rapid neurological transmission and processing requirements. Similarly, the nerve and muscle capability for rapid and precise sequences of movements for speech. Within the brain, recent imaging of language processing shows activity in Broca's area when understanding structured sentences. However, it is not activated when processing only simple communication (Friederici, 2006). Many animals can recognise this simple level of communication; not just chimps, but also pet dogs (see first article in *Origins* 42).

We cannot but be struck by the enormous complexity of both language and the anatomical and neurological events that underlie it. Both the linguistic and anatomical processes are chains of events that must work together from beginning to end for effective communication. An error or failure at any point would lead to breakdown in communication with all the dire consequences that are familiar to us from our every day lives to global crises. We see the results of a damaged communication chain in a range of different language disorders in children and also in many stroke patients. Evolutionary origin by mutation and natural selection would require many events to occur simultaneously. Similarly, co-option of features previously used for other purposes in hypothetical pre-lingual ancestors would also required many simultaneous adaptations as so many features are language specific.

An evolutionist suggesting that language arose in a much simpler form that gradually changed must account for the origin of complex systems fundamental to all human language, the language acquisition device, the cognitive process behind sentence construction and also word storage and retrieval systems to name a few. The independence of the building blocks of language from the meaning expressed is also highly indicative of intelligent design. ■

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An evaluation of punctuated equilibrium as a mechanism for evolution

Hans Degens

Introduction

The theory of evolution states that all present life-forms are descendants from a universal common ancestral life form that underwent transformations over time. Lamarck proposed the inheritance of acquired characteristics as a mechanism for evolution, but soon this idea was disproved. In 1859 Darwin published 'The origin of Species' in which he argued strongly for natural selection as the main mechanism for evolution. Natural selection is the process whereby a) 'any variation, however slight, if it be in any degree profitable to an individual, will tend to the preservation of that individual, and will generally be inherited by its offspring, and b) whereby the offspring thus will also have a better chance of surviving, for, of the many individuals of any species which are periodically born, but a small number survive' (Darwin, 1859, p. 115). This idea was based on his extensive observations that artificial selection could produce organisms that were quite different from individuals in the original population through the accumulation of slight but useful variations. He argued that, by analogy, natural selection could cause the rise of individuals quite different from those in the original population. Ultimately, this process would then be able to account for the rise of new species and thus be the mechanism by which evolution proceeds.

Natural selection, however, acts only on the genetic material that is present and consequently can only cause changes in the gene-frequency distribution, and ultimately may even weed out genetic information that provides no positive selective value; it does explain survival but not the arrival of a new kind of plant or animal. As a result, the change that can be obtained by this process is limited to microevolution, whereby microevolution is defined as phenomena at the level of populations or species (Carroll, 1997 p. 10) and is observable in nature.

Starlings Valerie Crafter © 2007 iStock International Inc. Colonisation of the USA by small populations of starlings did not resulting the formation of new species

Microevolution concerns changes at the population and species level. This type of 'evolution' is regularly observed and is mostly a reflection of alterations in gene frequencies. Minor mutations may also contribute to the change.

Macroevolution concerns major innovations, like new structures and body plans that require new genetic information. This is never observed in nature.

For macroevolution, that is evolution of new structures and body plans, which has never been observed, to take place new information has to be added to the genetic pool of a population. The principal source of this new genetic information is believed to be mutations, although also other mechanisms are likely to contribute (Surtees, 2001). Natural selection would favour beneficial mutations and given enough beneficial mutations, over time, a new species could gradually evolve. The evolution of a new species would thus involve many intermediate stages, which all have a chance to fossilise. Consequently, one would expect many transitional forms in the fossil record bridging the gap between the ancestral and descendent species. Yet, the fossil record does not show this, but rather 'significant gaps between most of the major groups and between most well-known species and genera … which may give the impression of sudden appearance of taxa, but provides no evidence of evolutionary rates or processes' (Carroll, 1988; p. 571). Darwin (1859) noted that this was one of the gravest objections to his theory. In addition, the record is characterized by long periods of no change, called stasis.

Mayr proposed that most speciation events take place in isolated founder populations, restricted in space and time, which are unlikely to be preserved in the fossil record (Mayr, 1954; 1997, p. 70). This proposal provided an explanation as to why transitional forms are unlikely to be found as fossils (Mayr, 1954; 1997; p. 194-195). The idea was taken up by Eldredge and Gould who coined the term 'punctuated equilibrium' (Eldredge & Gould, 1972; Mayr, 1997; p. 195). Carroll (1988; p. 578) describes this mechanism in more detail as follows: 'Mayr proposed that rapid change is much more likely to occur in small populations restricted to limited geographical areas than in large widespread species. Environmental differences within small areas are likely to be limited, so that it is not necessary for the population to retain a wide range of alternative alleles to cope with geographically variable conditions. In small isolated populations, inbreeding will lead to homozygosity (having two identical alleles of a gene), so that recessive as well as dominant traits will be exposed to selection … Population isolation can be considered a prelude to speciation'. Further, Mayr (1954; 1997 p. 183) suggested that the founder population may thus undergo dramatic genetic restructuring which would be useful for macro-evolutionary developments. The keys in the proposed mechanism of evolution by punctuated equilibrium are thus: isolation, homozygosity, natural selection and genetic restructuring. In the next part of this article I will provide evidence that these keys do not usually result in rapid evolution, but rather in extinction and degeneration.

Genetic considerations

Theory

As mentioned above, in the model of 'punctuated equilibrium', population isolation is considered a prerequisite to speciation. Isolation of a population from other populations of the same species might occur by geographical barriers such as rivers and mountain ranges, or by habitat fragmentation due, for example, to human activities. Since organisms are not genetically identical, a small isolated population will have a lower genetic variability than the original population (Wright, 1932). This phenomenon has been dubbed the "Bottle Neck Phenomenon". As a result of the "Bottle Neck" there may be a rapid change of genotype and phenotype because the allele frequency of the isolated population may not be a representative sample of the parent population, thus seemingly supporting the concept of rapid evolution according to the theory of punctuated equilibrium. However, the raw material for natural selection, the genetic variability, is reduced in the isolated population (Mayr, 1954). This increases the vulnerability of the population because of its limited adaptability to altered circumstances and diseases. Genetic drift, being stronger in small populations, will further reduce genetic variability and it causes alleles to become fixed in the population largely irrespective of natural selection (Wright, 1932). Moreover, the increased incidence of inbreeding results in homozygosity (Mayr, 1954; Soule & Mills, 1998; Westemeier *et al.*, 1998), which is not likely to give evolutionary advance (Wright, 1932).

New genetic information is thought to be principally generated by mutations. Most mutations are deleterious, slightly deleterious or in the best case neutral. Even if a mutation with a positive selective value would appear in a large population, the mutant will most likely disappear as a consequence of genetic drift, irrespective of the selective value (Encyclopaedia Britannica, 1988; Spetner, 1997). In a small population a mutation, let alone one with a positive selective value, is even less likely to occur. Moreover, the chances of survival of the mutation are decreased as a small population is more prone to extinction (Spetner, 1997, p. 80). The net effect is that the survival of a mutant is lower in a small population rather than in a large one (Spetner, 1997, p. 57, 81) and contrary to the claims of 'punctuated equilibrium' mutations are thus less likely to result in speciation in small than in large populations. Only in the exceptional case where a small population rapidly increases in size is it likely that a mutant or new allele will survive and become established in the population (Surtees, 2001). This only occurs, however, under conditions that are optimal for the survival and growth of the population (Surtees, 2001) as the reduced genetic variability increases the vulnerability of that population (Mayr, 1954). It should be noted that with the growth of the population the chance of survival of mutations in the population diminishes and thereby the chance of speciation. Indeed, in the case of the successful colonisation of the USA by the initially small populations of House Sparrow and European Starling, no speciation events took place (Mayr, 1954). Speciation events that have been recorded are largely explicable by altered gene frequencies rather than the development of new genetic information. For instance, the large diversification of Cichlid fish in Lake Victoria, is now, with the water becoming turbid as a result of eutrophication, disappearing at an alarming rate (Seehausen *et al.*, 1997). The turbidity of the water hampers assortative mating (like mates with like) based on similarities in colour, for which adequate vision is a prerequisite. As a consequence of the turbidity, the incidence of interbreeding between species increased resulting in the loss of species diversification (Seehausen *et al.*, 1997). The fact that interbreeding is possible despite different species status supports the notion that the diversification was not so much the result of new genetic information as it was to differences in allele frequencies in the different species. A similar situation occurred with Darwin finches on Santa Cruz Island, where finches with medium-sized bills are now very common, whereas the previously existing large- and small-sized bill birds have largely disappeared (Holmes, 2006).

Even though the 'nearly neutral theory' states that in large populations there will be selection against slightly deleterious mutations, it also states that in small populations they may behave as neutral mutations (Ohta, 1996). Consequently, the chance of the accumulation of slightly deleterious mutations is inversely related to population size (Ohta, 1996), making small populations particularly vulnerable to accumulation of deleterious mutations.

In conclusion, in small isolated populations it is more likely that genetic degeneration and extinction occurs, rather than evolution. Only in the rare instance of rapid population growth under optimal conditions, as for instance immediately after the flood, speciation events may occur (Surtees, 2001).

Field observations

Although the previous paragraphs are theoretical, nature conservation has some useful examples on the effects of population isolation and habitat fragmentation on the survivability of a population. It has been found, for example, that an isolated population of prairie chickens gradually declined from 2000 to 50 individuals in the course of 32 years. This was consequent to a decline in fitness, measured as fertility and hatching rates of eggs, which in turn was caused by a concomitant decline in genetic diversity. Indeed, only after translocation of birds from genetically diverse populations to the isolated population egg viability increased and the population recovered (Westemeier *et al.* 1998). Also

Ciclid Fish Terry Healy © 2007 iStock International Inc. Speciation events amongst Ciclid fish are largely explicable by altered gene frequencies rather than the development of new genetic information. Hybridisation in the increasingly turbid waters is now leading to a loss of species diversification.

the survival of several populations of fresh-water fish in Belgium is threatened consequent to inbreeding caused by their isolation from neighbouring populations by dams, overflows etc. (National Geographic, 2002). These examples do not stand on their own, and the reduced fitness accompanying population isolation, leading to a further decline in numbers and eventual extinction of the isolated population has been termed the "Extinction Vortex" (Soule & Mills, 1998). It is thus not surprising that nature conservationists are much interested in the size of the so-called 'minimal viable population' that ensures maintenance and growth of a threatened population. In contrast, the successful expansion of small populations of European Starlings and House Sparrows to become two of the common birds of the USA shows that occasionally a small population may escape extinction and grow successfully (Mayr, 1954). Generally, isolation poses a serious threat to population survival, and does not result in speciation (Mayr, 1954), as the theory of punctuated equilibrium hypothesized, let alone macro-evolution.

Habitat fragmentation

It is a common observation that population density is highest in the centre of the habitat and decreases towards the edges. This phenomenon has been called the edge effect and reflects the fact that in general at the centre of a habitat the most suitable conditions for the population are found declining to the edge of the habitat (Murcia, 1995; Purves *et al.*, 1996). If a population becomes isolated following habitat fragmentation for example, the relative edge area of the fragmented habitat increases and concomitantly the edge effect becomes more pronounced. This is a serious concern in conservation biology as it has a negative impact on population survival (Murcia, 1995; Purves *et al.*, 1996). It is notable in this context, that a decline in habitat quality might cause individuals of a species to migrate elsewhere to improve their reproductive success and survival (Purves *et al.*, 1996) contributing further to the demise of the local population. In addition to the reduced quality, also the diminished area of the habitat will contribute to a decline in population size as the size of the sustainable population is among others determined by the size of the habitat. Finally, the so-called Allee effect, the phenomenon that the death and birth rate increase and decrease, respectively, with decreasing population density, might further contribute to the decline of the already vulnerable isolated population (De Roos & Persson, 2002). The Cod population near Canada, for instance, was severely diminished due to over-fishing, and despite a complete prohibition of further fishing for about 10 years, the population has not yet recovered (De Roos & Persson, 2002).

Conclusion

Nature conservation has revealed that population isolation poses an important risk for extinction, rather than to initiate a speciation event as postulated by the theory of punctuated equilibrium. The demise of an isolated population is caused by, among other factors, the decreased genetic variability diminishing the capacity of the population to adapt to e.g. diseases or changes in climate, resulting in a further decline in numbers and thus genetic variability etc. This process is so common that conservation biologists have dubbed it the "Extinction vortex". The observations are opposite to what the theory of punctuated equilibrium predicts and correspond with a perfect creation that can only degenerate. Only under exceptional circumstances, where a small population is exposed to optimal conditions allowing rapid population growth new alleles may arise and lead to speciation events (Surtees, 2001). ■

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Exploring the History of Life The Fifth Conference of the Creation Biology Study Group (BSG)

Cedarville University, Cedarville, Ohio
Wednesday 7th June – Friday 9th June 2006

Report by Paul Garner

The Fifth BSG Conference was held between 7th-9th June 2006 on the campus of Cedarville University, Cedarville, Ohio. There were forty-six attendees. I was the only representative from outside the USA. This was the third time I have attended a BSG conference, the previous two being in Tennessee and Idaho. This year a journalist from the *Washington Post* was also present throughout the conference.

Statistical Baraminology Workshop

The day before the conference began there was a Statistical Baraminology Workshop led by Dr Todd Wood. The workshop consisted of three parts:

1. **Introduction.** This consisted of an historical review of the development of creation biology (generally) and baraminology (specifically) from about 1900 to the present day (see inset box 1). There was a particular focus on the contributions of George McCready Price, Harold Clark, Frank Marsh, Walter ReMine and Kurt Wise. The material on the synthesis proposed by Frank Marsh represented a substantial revision of the discussion in Todd Wood's book, *Understanding the Pattern of Life* (Broadman and Holman, 2003).
2. **Calculations and Explanations.** This was an exploration of the methods of statistical baraminology, introducing the concepts of baraminic distance, character relevance, taxic relevance, baraminic distance correlation and multidimensional scaling.
3. **Using BDISTMDS.** This involved a practical look at some sample datasets, along with analyses and interpretations using the software now available on the BSG website (www.bryancore.org/bsg/bdistmds.html). The software makes doing the statistical analyses much easier than before!

The workshop was very helpful in consolidating my understanding of the statistical methods involved and the potential problems that may be encountered. Each participant was provided with a 59-page workbook which will be a useful reference source. Based on the success of this workshop, seminars on other topics are likely to take place alongside future BSG conferences.

Plenary sessions

The conference itself took place over three days. There were three plenary sessions:

1. **Dr Kurt Wise** proposed some baraminological criteria for identifying the Flood/post-Flood boundary in the stratigraphic record. He referred to a previous study which concluded that the Cenozoic horse series represented intrabaraminic diversification after the Flood. By contrast, he suggested that Mesozoic sequences of transitional fossils showing increasing mammal-likeness and bird-likeness in multiple families lacked an explanatory environmental trend and may be due to transitional ecologies in the pre-Flood world.
2. **Dr Roger Sanders** discussed three claimed instances of adaptive radiation in plants – the rosette-tree dandelions and daisies of the Robinson Crusoe Islands and the tree-sunflowers of the Galāpagos Islands. He concluded that these radiations were actually non-adaptive and occurred when latent, created information was expressed in small, fragmenting populations that colonized newly exposed habitats after the Flood.
3. **Dr Art Chadwick** explained his ground-breaking research on the taphonomy of a dinosaur bone bed at the Hanson Research Station in Wyoming. His work employs high-resolution GPS data combined with digital photographs of the bones to show the way they look in the ground. The bones form a normally-graded bed in the middle of poorly consolidated clay to mudstone and are associated with a mixture of freshwater, brackish, marine and terrestrial fossils. The bed is interpreted as having been deposited by a density current in relatively deep water. The dinosaurs appear to have been killed *en masse* in a freshwater setting, where they rotted, then the bones were re-suspended and transported into a marine shelf environment. A website about this work can be found here: http://dinodig.swau.edu/the_project/

Research sessions

In addition eleven research papers were orally presented:

1. Dr Todd Wood outlined his research suggesting that the archaeocetes ("ancient whales") are not morphological intermediates between modern whales and artiodactyls (hoofed animals with an even number of toes).
2. Drs John Whitmore and Kurt Wise presented data showing that fossil organisms from the Green River Formation (Eocene) display high disparity but low species diversity and suggested that this is consistent with an early post-Flood age for these Eocene sediments.
3. Jean Lightner presented hybridization data for the Cervidae (deer) that will help to elucidate baraminic relationships.
4. Dr Doug Kennard gave a theological talk on the biblical concept of soul and its holistic meaning of "complete living being". He outlined ways in which this concept provides a framework for bioethics.

Fig. 1 Cedarville University was host to the 5th BSG conference "Exploring the History of Life" © 2006 BSG.

Fig. 2 Dennis Flentge was the moderator for the conference © 2006 BSG.

5. Dr Steve Gollmer spoke about the study and modelling of gene and protein networks. He suggested that static designs are "brittle" in a changing environment and that choice in biological systems points to the volitional activity of the Creator.
6. Dr Joe Francis gave a fascinating talk about the origin of pathogenicity in the bacterium genus *Vibrio*. Most *Vibrio* species are not pathogenic and have symbiotic relationships with other organisms. *Vibrio cholera* has recently been shown to play a beneficial role in chitin recycling.
7. Dr David Fouts spoke about man "as" – rather than "in" – the image of God, focusing upon man as a representative of God commanded to subdue the created order and rule over it as a faithful steward.
8. Isaac Demme argued that purpose and design in living organisms cannot be understood apart from the biblical framework of creation, curse and new creation. He highlighted the ubiquity of post-curse design elements.
9. David Cavanaugh presented a baraminological analysis of fossil and living arthropods. There is a large gap in morphospace separating the arthropods from annelid worms but baraminic boundaries within the arthropod group have yet to be elucidated.
10. Dr Tim Brophy reviewed the available hybridization data for modern turtles. There is evidence of interspecific hybridization in eight of the thirteen extant families but no reported hybridization between families.
11. Jonathan Bartlett spoke about the symmetry between the genome and computer programmes, both of which are designed digital codes, and predicted that meta-programmes would be identified in the genome.

Posters

On Thursday evening there was a poster session with opportunity for more in-depth discussion of several of these research presentations, as well as some that had not been presented orally.

Conference proceedings

The proceedings of the conference can be downloaded from the BSG website: http://www.bryancore.org/bsg/opbsg/008.html

Inset box 1: **What is baraminology?**

The Bible teaches that God created the major groups of organisms separately – and upon this foundation a creationist theory of biology can be built. An early contribution was made by a Christian biologist called Frank Lewis Marsh (1899-1992) who concluded that God had made organisms in groups called 'kinds'. In 1941, he introduced the concept of the baramin – taken from the Hebrew meaning 'created kind'.

The 'created kind' or baramin is not the same as the modern species. Marsh regarded each baramin as a broad group probably encompassing many species. While each baramin had been separately created, Marsh suggested that a great deal of variation was possible within the created group. For instance, he considered all dogs – at least wolves, coyotes, jackals, dingos and domestic dogs – to be members of a single baramin. Finally, Marsh regarded the ability of two organisms to hybridize – i.e. to cross-breed – as evidence that they belonged to the same baramin.

Many creation biologists have taken up Marsh's ideas and endeavoured to build upon them. In recent years, this has led to the development of baraminology – a creationist system of identifying and classifying the created groups. Baraminology has matured into an exciting field of study with its own conferences and publications. The idea is to use many different criteria to 'home in' on the created kinds by looking for similarities and differences. Baraminology does not try to identify each baramin in one go; rather, it works by successive refinement. Larger groups are split up and smaller groups are added to, until all the members of the baramin have been identified. Several groups have already been studied using the methods of baraminology and studies with other organisms are awaiting publication.

A helpful introduction to baraminology and its terminology can be found on the Creation Research Society website:

Frair, W. (2000). Baraminology – classification of created organisms. Creation Research Society Quarterly, 37(2):82-91.

http://www.creationresearch.org/crsq/articles/37/37_2/baraminology.htm

Inset box 2: **Joining the Creation Biology Study Group (BSG)**

The BSG has now become a formal society of professionals in the biological and related sciences or theology who (1) hold or are working towards an advanced degree in a relevant field (exceptions to this are made on an individual basis) and (2) are Christians accepting the authority of Bible (i.e., Old and New Testament canons) in all areas. The group is organized to be a community for mutual encouragement and Christian fellowship to those researchers dedicated to discovering the Creator and the outworking of his design for the present living world. The ultimate goal of the BSG is to develop origin models that accommodate empirical data in a biblical framework of earth history through scientifically sound analysis of biological data and scholarly analysis of biblical texts.

Membership costs $20.00 per year. Enquiries should be directed to Dr Tim Brophy, Associate Professor of Biology, Liberty University, 1971 University Blvd, Lynchburg, Virginia 24502, USA. Email: tbrophy@liberty.edu

Next year's conference

The theme of the next conference will be "All Creation Groans: The Problem of Natural Evil". It will be held between 13th-15th June 2007 at Liberty University, Lynchburg, Virginia. Details will be posted on the BSG web site in due course: http://www.bryancore.org/bsg/

Fig. 3 Delegates brainstorming during the poster session © 2006 BSG.

Reflections on the BSG Conference from a newcomer

Jonathan Bartlett

Is there a reliable way to tell the Flood/post-Flood boundary? Are there worldwide stratigraphic markers that tell the limits of Flood geology? What was the post-Babel timeline? What are the causes of fossil sorting in the fossil record? These are the sort of questions I was hoping to have answered at the annual conference of the BSG: A Creation Biology Study Group (formerly the Baraminology Study Group). During the conference, which had the theme 'Exploring the History of Life', there was plenty of time for discussion. While there were not explicit answers to very many of my questions, I feel like I understand the issues much better.

Kurt Wise's talk dealt with the Flood/post-Flood boundary. In it, he suggested a mechanism for telling the Flood/post-Flood boundary that I had not thought about before – using patterns of diversity to help identify the cause of sorting. He suggested we might be able tell the difference between Flood and non-Flood sediments based on the kind of diversity found. Since the Flood is not a time sequence (or at least not much of one), directionalized intrabaraminic diversification should indicate non-Flood sediments, while patterns of diversity across baramins should indicate Flood sediments, with ecological zonation being the primary cause. The idea of using the Flood sequences to partially reconstruct the pre-Flood world is something that I had not considered before. Of course, every idea has its problems, and Kurt pointed to the mammal-like reptiles at the end of the Flood showing what looks to be a post-Flood diversification pattern rather than a Flood diversification pattern. The need for developing a systematic view of the Flood and fossil sequence was painfully obvious by the end.

After the first round of talks, we had several discussions over dinner about the Flood and fossil record, some of which were even more interesting than the research presentations. Among the ideas discussed were whether or not some of the layering of the geological column was formed from precipitation of dissolved material at different temperatures, some of the interesting fossilization patterns in the geological column, and the nature of animal form in the pre- and post-Flood world.

Along the same lines, the talk about the Green River Formation (GRF) was interesting because it gave a glimpse of the nature of animal dispersal and diversification immediately following the Flood. The evidence from the GRF indicated that a huge disparity of organisms had dispersed worldwide almost immediately after the Flood, but that the process of diversification had only just begun.

One of the things that always surprises me about Creationism is how well-developed the theory is considering the small number of people working to develop it. It is often assumed by the public that a theory, once proposed, requires little additional effort. In fact, for a theory to be successful, it requires continual evaluation and refinements, especially if it is competing with already-well-established theories. It was a little disturbing to see how little time and resources creationists have to investigate and develop creationary theory, but on the other hand it is a testament to the validity of the theory just how far it has come with the amount of resources available.

My one big disappointment with the conference was that, for a conference exploring natural history, there was a paucity of geologists and geology talks. This should probably be expected from a biology study group, but nonetheless, it was slightly disappointing.

Fig. 4 Art Chadwick discussing the ongoing work excavating dinosaurs in Wyoming © 2006 BSG.

Giving a talk was quite an experience. Being in computer science, I was very hesitant when the call for papers was posted, yet there was an idea about the relationship between computer science and biology that had been nagging me for some time. I asked a member of the editorial board whether I should submit the abstract, and they encouraged me to do so. After submitting it, the review came back asking for what could be predicted from such a study. I thought, "what on earth can a programmer predict about biology?" I researched one of the examples I had mentioned in my original abstract further, and had an idea. I rewrote my abstract completely and submitted it. To my amazement, it was accepted.

The talk itself spurred on a large amount of discussion with a number of people. Many people had very interesting ideas and applications to go along with my talk. This was precisely what I had come to the conference for – to think about biology in a creation perspective with other people who care deeply for the subject.

The ability to talk intelligently about creationism with people from many different areas of biology who knew much more about the subject than I did was probably the best part of the whole conference. There were no disciplinary turf wars and no looking down on people who are new to the movement. Just a lot of people trying to do science from a Christian perspective, and helping others do the same.

The worst part about the whole conference is the year-long wait until the next one. ■

“Origins North-West”
– The vision behind this newly formed group

Alan Birchall – Hon Chairman Origins Northwest

As a Design Engineer, I have always had an interest in Science, the structure of materials and how things operate. Some twenty years ago, the opportunity to hear Prof. EH Andrews speak in Liverpool on: “Is Evolution Scientific?” sparked a long term and growing personal interest in the subject and its implications on society.

As a Christian, I believed in God, as Creator, but I needed to sort out Evolution. I began to read creation science books and became aware of the largely unscientific nature of evolutionary thinking and the impact it had had on Church and Society over the last 150 years.

I was also challenged by some non-scientific books such as, Spurgeon’s sermons to his students at the end of the1800’s (which indicated how he could foresee the way Society would be negatively influenced by Humanistic, Materialism and Evolutionary thinking). Also “The rise of the Evolution Fraud” by M. Bowden (which outlined the influences and possible motives of people such as Lyle and Huxley in Darwin’s time and subsequent consequences to society.)

More recently after an opportunity to listen to Paul Garner of BCS, I arranged for a Creation Weekend at our local Church to raise the profile, and provide some teaching on the subject, whilst providing a further opportunity of bringing other churches together in the town – something that has become a growing feature in the Northwich area over recent years.

Paul ran three sessions: “The Missing Millions”; “The Truth about Human Origins”; & “Voyage to the Planets”. These were well received and they generated considerable discussion and interest. I had the impression that many Christians were pleased that this subject was becoming more out in the open and that well qualified people were speaking about it with confidence. At last, there was no need to be on the defensive about the biblical account of origins and people were surprised at the wealth of scientific information available on creation. Consequently, further discussion arose with a few scientist contacts, and others, who had attended. Out of this a Vision arose for the provision of teaching and resource links to Church Members, Schools, Teachers, Parents & Students, with a view to balancing the disproportionately high amount of evolutionary teaching in schools and the media and to give people confidence in the reliability of God’s Word. It has been disconcerting to hear how atheistic approaches are being encouraged in our schools by some adherents to Evolution, who want to write God out of the curriculum.

The Vision was underpinned by ensuring that we would endeavor to present examples of good scientific enquiry, linked to an understanding of the basic truths in God’s Word. Our intention is to provide Science Lectures every two months throughout the year and we currently hold an email database of about 500 schools, individuals and churches, which we can circulate with details of meetings.

So far, we have had between 36 – 60 people attending these meetings and on each occasion the Scriptural and scientific validity of the presentation has been emphasized and that human observation is always influenced by each individual’s worldview. This applies to the evolutionist just as much as to the creationist. The observable evidence is the same for both. However we have to guard against making unscientific assumptions to fill in the gaps.

We believe that this sort of information should be made more accessible to our Society and that our young people, in particular, should be given the opportunity to examine that evidence and the different interpretations by which it is portrayed, which will also provide an impetus for appreciating true scientific activity.

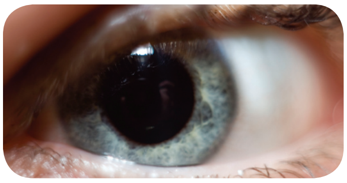
Our first meeting was in June and the lecture was entitled ” Truth Lies and Science Education” given by Paul Taylor from “Answers in Genesis”. Our second meeting was lead by Dr Nancy Darrall the subject being – “Icons of Evolution or the Hallmarks of Design?” Our next meeting is on Thursday 30th November at The Quality Hotel (“The Floatel”) in Northwich at 7.30pm. Dr Paul Garner will lead us again, this time on the subject of “The Fossil Record”. In January we are planning to have Dr David Tyler – Lecturer at Manchester University and Member of BCS speak to us. (Subject to be confirmed). We are hoping that John Mackay (Director of Creation Research) will be able to join us during the Autumn 2007 when we hope to have a Sixth Form Conference in addition to our usual meeting.

We have been amazed and encouraged by the excellent resources now becoming available on a number of websites and our prayer is that there will be many other groups like ours around the country who will catch a similar vision. We trust that this will help provide a more balanced viewpoint for people throughout the land on which they can make a decision about their origins rather than rely upon the predominantly atheistic evolutionary teaching we have today. ■

Further information: origins.northwest@yahoo.co.uk

Intelligent Design – the eye

Tree Frog micky007 © 2007 sxc.hu



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Nationwide thought for the week: Intelligent Designer

Rev. David V. Jebson

May I refer to my experience with atheists or those who still cling to the theory of evolution. For years I tended to start by talking about the wonders of creation, for example the awesome design of the human eye that baffled Darwin and would even have left him speechless if he had known as much as we do today! The result of this approach was usually a rather unprofitable argument.

More recently when dealing with atheists I have started by asking them whether they have a conscience. One man said, "No!" so I asked him how he knew the difference between right and wrong. "O," he said, "I just feel it inside!" "Well," I said, "That's the voice of God in you!" To my amazement he said, "Tell me more!" This led to a profitable conversation and a presentation of the Gospel.

What is absolutely certain is that we should study to know as much about the wonders of God's creation as we can. However with an increasing number of people accepting the theory of Intelligent Design they happily like to talk about intelligent design but not about an intelligent designer. In view of this it is good to focus on the voice of conscience which is in every human being. [Romans 1:15] I point out to atheists that conscience is intangible and invisible and yet is programmed with moral information that can never have evolved from, molecules. A crook can never ask a surgeon to cut out his conscience because it's hurting him! It simply does not physically exist.

Sometimes if the person is interested I go on to say that, if conscience were evil, it would make us feel glad when we're wrong and sad when we're right! Because it works the other way round it shows that it is the kind voice of God that is designed to encourage us to obey His good laws, for, "In keeping them there is great reward." [Psalm 19:10]

To sum it all up, morality can only come from personality never from molecules or matter. This axiom brings the unbeliever face to face with a personal God and not a designer which is a supreme mathematical equation!

"Nationwide Thought For The Week" <ntftw@jewells.fsworld.co.uk> 3/10/2006

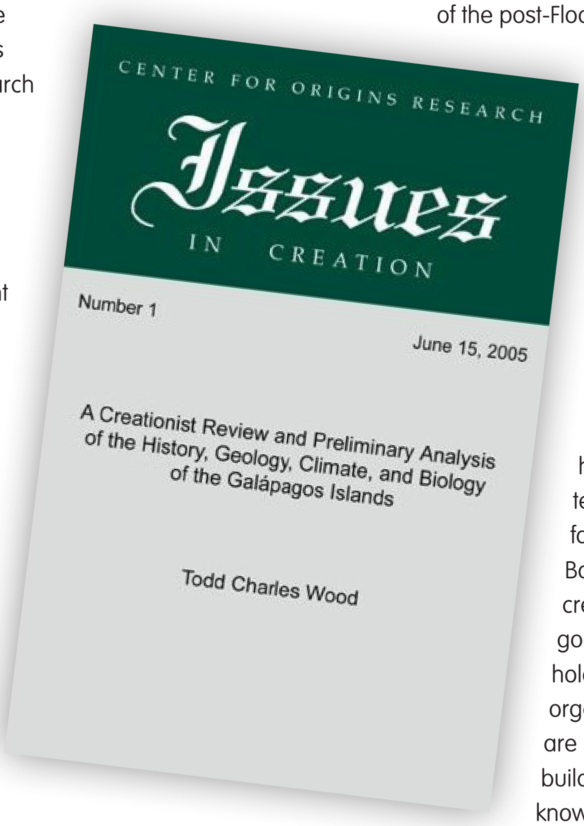
Book reviews

A Creationist Review and Preliminary Analysis of the History, Geology, Climate, and Biology of the Galápagos Islands

by Todd Charles Wood

Center for Origins Research (CORE)
Issues in Creation Number 1. Wipf and Stock Publishers, Eugene, OR. 2005
Pages 241pp **$36.00 (US).**
ISBN 1-59752-180-9

Review by Colin Reeves


CENTER FOR ORIGINS RESEARCH
Issues
IN CREATION
Number 1
June 15, 2005
A Creationist Review and Preliminary Analysis of the History, Geology, Climate, and Biology of the Galápagos Islands
Todd Charles Wood

This book is the first of what sets out to be a long series of monograph-length works published by the Center for Origins Research at Bryan College in Dayton, Tennessee, USA. According to Dr Kurt Wise, editor of CORE Issues in Creation, the series "has been created to publish any monograph in any discipline…which substantially contributes to the systematic development of a positive, young-age creation model" (Series Introduction).

Dr Wood's book offers a preliminary creationist interpretation of the Galápagos Islands, which "have long served as an example of, and apologetic for, evolution". This soft cover book is divided into five chapters with 241 pages, 45 figures, six tables, one appendix, and eight color plates. Chapter one gives a general introduction to the geographical and historical setting of the Galápagos Islands, reviews the history of creationist comments on the islands, and lays out a plan of attack for the rest of the book. Most striking, however, are Dr Wood's introductory comments regarding the "modern myth of the Galápagos as a catalyst to the discovery of evolution".

In chapter two, Dr Wood continues his discussion of this myth and concludes that "the relationship of Darwin's intellectual development to the islands has been overstated". According to Dr Wood, Darwin's development of evolutionary theory came in two stages: 1) transmutation (i.e. species are not fixed entities but have the capability to change from one species to another); and 2) natural selection as the primary mechanism to explain transmutation. After a thorough review of Darwin's own writings on the subject, Dr Wood makes a convincing argument that Darwin's visit to the Galápagos contributed to his acceptance of transmutation but not his ideas on natural selection. This is a striking claim because of persistent myths to the contrary.

Chapter three gives a thorough, yet at times technical, review of the geology and climate of the Galápagos Islands. Dr Wood brilliantly applies the Catastrophic Plate Tectonics model of Austin *et al* (1994) to the specific geology of the Galápagos and concludes that the islands are entirely post-Flood in origin. The climate section of this chapter focuses on the extreme climate variations of the modern islands produced by the El Niño Southern Oscillation. Most interesting, however, is Dr Wood's discussion of the post-Flood climate of the Galápagos and his provisional acceptance of the occurrence of extreme precipitation immediately following the Flood. Chapters one to three of this book are truly impressive, but Dr Wood's major contribution comes in chapter four.

In chapter four, Dr Wood "substantially advances the entire discipline of creation biology with his application of baraminological techniques to the Islands' flora and fauna" (Wise, Series Introduction). Baraminology is the study of God's created kinds or baramins. The goal of baraminology is to identify holobaramins (groups of known organisms that share continuity and are bounded by discontinuity) by building up monobaramins (groups of known organisms that share continuity, without regard to discontinuity with other organisms) and breaking up apobaramins (groups of known organisms bounded by discontinuity, without regard to internal continuity of its members). Dr Wood far surpasses this goal by presenting several new baraminological analyses that include the discovery of seven new holobaramins and ten new monobaramins. This chapter also presents intriguing creationist interpretations of mediated design versus degeneration, biological imperfection, and Galápagos biogeography.

Giant Tortoise Rebecca Picard © 2007 iStock International Inc.

Chapter five outlines the major conclusions reached by the study, including the assertion that "rather than being good examples of evolution, the biology and geology of the islands are consistent with a young-earth creationist model of earth and life history". Dr Wood also gives many practical suggestions for future creationist research in this and other chapters. Chapter five is more than just a summary, however, because Dr Wood has one more analysis up his sleeve. This final analysis looks for separate evidence of adaptation and radiation in six groups of Galápagos organisms frequently attributed to adaptive radiation. Dr Wood concludes that only Darwin's finches show clear evidence of adaptive radiation, whereas several other groups show evidence of radiation but not adaptation. The latter suggests that radiation can occur without environmental adaptation, a finding consistent with the young-earth creation model.

The book ends with 32 pages of references and an appendix outlining the use of multidimensional scaling in baraminology. The 520 individual references listed in this book represent an extremely thorough coverage of relevant creationist and non-creationist literature, and should serve as a valuable resource for future researchers. I did, however, discover one minor error in the references section. Leonard Brand's 1997 book (see References of this review) was cited on page 123 of the monograph but was not listed in the references section. I also found two sentences in the book that were missing a single word. Finally, I find that several of the black and white photographs and colour plates are of a slightly inferior quality. These minor problems, however, in no way detract from the overall quality of the book. This monograph represents a major contribution to creation science and goes a long way in advancing the young-age creation model. Every serious creation scientist must read this book. Because of Dr Wood's smooth and easy-to-read style, this somewhat technical work can also be read by anyone who has even a casual interest in the young-earth creation model. This book is available for purchase at the CORE Issues website: http://www.bryancore.org/issues/index.html. ■

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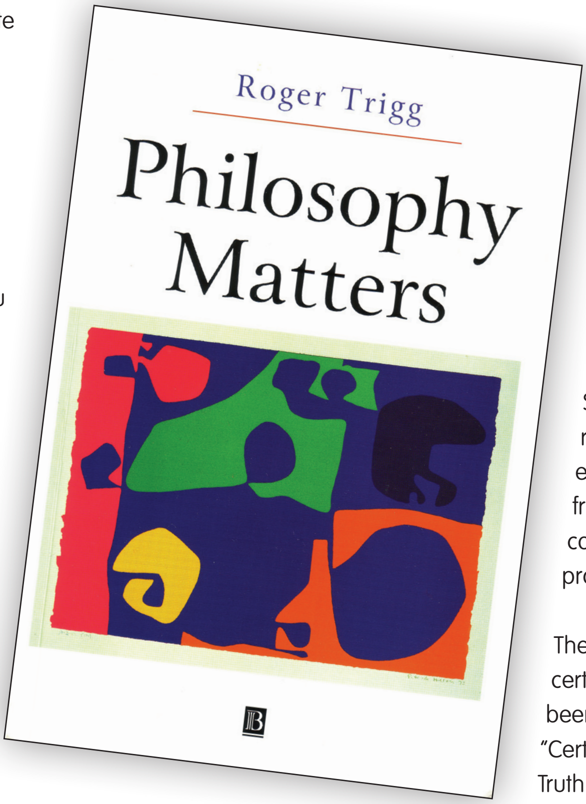
■ **Philosophy Matters**
by Author Roger Trigg
Published by Blackwells
ISBN 0-631-22545-5 (hardback)
ISBN 0-631-22546-3 (paperback)

Reviewed by Harriet Gray



"Your beliefs are only true for you, but not me" … "There is no such thing as absolute truth" … "Nature is all there is: there is no spiritual realm guiding our brains." We commonly encounter comments such as these nowadays, and sometimes it can be a struggle to repudiate them. Roger Trigg's "Philosophy Matters" provides an arsenal of arguments from an important perspective…philosophy. Now before you drop this review like a brick ("philosophy – no thanks – philosophers are like blind guides!), I want to say that I found this book compelling reading, and even entertaining! Trigg gently brings a Christian perspective, which helpfully cuts through some of the philosophical morass of contemporary ideas. Professor of philosophy at Warwick University, Trigg was also the first Chairman of the British Philosophical Association, representing all British philosophy departments.

It was fascinating to discover that the Athenian Greek philosophers four to five hundred years B.C. struggled with exactly the same issues as today – namely relativism and materialism! And for the same reasons. Just as in our multi-cultural society, the Greeks were exposed to a cultural ferment from every direction. There was mysticism from the East; the more analytical thinking from the West; plus the Greek city states with their own laws; and contact with Egypt and Persia brought customs even more foreign to the Greeks. Thus philosophers began to question the validity of local customs and beliefs, leading to Protagoras proposing that "a belief is only true for those holding it" (does that sound familiar today?!). Trigg indicates how we confront the same matters nowadays: how can I decide who is right and wrong? … do I have to? … Is the only reason for holding a belief that I happen to hold it? Is there firmer ground on which I can stand, to appeal to standards everyone can accept?

The flaws of Relativism

Is there such a thing as objective truth? Does truth have a universal claim? These issues are alone worth buying the book for! Plato attacked Protagoras' relativism head on, by emphasising objective truth – what is true is true independently of the fact that particular people believe it. What is true for me has to be true for you also. For instance, perhaps you don't believe that it is raining outside. However, if it really is raining outside, even if you don't believe that it is, you will still get wet!

But this begs the question: what is knowledge? Philosophers who only question the meaning of words spawned the advent of linguistic analysis. This, according to Trigg, ducked the moral issues by describing actions rather than what we should do. "Words are tools, and we must keep our tools sharp, but we should use our tools and not just admire them". Trigg's perspective is refreshing!

So, what is knowledge? Should it be restricted to the results of empirical experiment and the theories arising from them? If so, then truth is confined to what is within reach of practising scientists.

The history of the world is full of people certain of their position but who have been proved wrong. Trigg cautions, "Certainty is no infallible guide to truth. Truth can never be arrived at by counting heads." Consensus science and politics, take note.

Relativism cannot accept the idea of an impartial standpoint, i.e. a view that is not a view from a localised somewhere. Yet, says Trigg, relativism, to be understood as a theory in the first place, needs such a standpoint. It demands a God's eye point of view to survey the myriad of human beliefs. Relativism wishes to claim from such a lofty position its grand conclusion that "there is no God's eye view".

Then how can we ever obtain knowledge? Trigg suggests that truth is not constituted by private certainty or public agreement, but is a matter of being connected with the real nature of things. Only what is real can be a genuine source of truth. So then what is real?!

Physicalism

One recent response to this has been Physicalism – what is real is only what is physical, or whatever is accessible to physical study. However, physicists do distinguish the observable from that which is beyond our reach to observe. From this has emerged the idea of innumerable universes ("multiverses"), the new orthodox belief of cosmologists today. Instead of a single universe operating according to the observed fundamental laws of nature, there are instead many alternative sets of laws resulting from contingent, chance historical processes. But Trigg's philosopher's sword cuts through this with ease! Asserting the existence of other universes with a dissimilar constitution to ours has little basis in physics, and is a "good example of a metaphysical belief which cannot be substantiated by any possible scientific investigation….Talking of whole universes which are in principle inaccessible raises the profound philosophical question why should we do so, when by definition no physical evidence from it will ever be forthcoming?"

Indeed, if there were, it would only prove we were not unconnected, and it would be part of our universe. He suggests that the quest for multiverses is a search for an alternative to the appeal to a Creator God: "the suspicion remains that the arguments about multiverses are ultimately anti-theological."

Yet even if there are multiverses, this still leaves the big question: why is there anything rather than nothing? Trigg asks, "An infinite number of universes seems no less surprising than one on its own."

Do theories need to be falsifiable?

Illuminating too is his response to the rather negative ideas of Popper and his falsification doctrines. Popper was always looking for what might make a theory false. Trigg responds: "this is probably too agnostic a position about the possibility of scientific knowledge…if we are always looking at how we might be mistaken, we might easily end in despair!"

Darwinism and Materialism

Why should the theory of evolution be assumed in the first place? To hold the theory, we have to assume an ability to understand the nature of reality. We have to trust human reason. This led the atheistic scientist Haldane to admit that he was not a materialist, saying, "if materialism is true, we cannot know that it is true." Similar to the problems of relativism, again there is no neutral ground on which to stand to make the judgement.

But truth has dropped out of the equation. Evolutionary theory tracks a continuity from genes right the way through to the final behaviour. Thus it seems that our behaviour is determined by our genes, and their components. As long as beliefs are evolutionarily advantageous, it matters not whether they are true or false. But then this undermines our ability to reason. Why should we put our trust in neo-Darwinism in the first place?

Once again, Trigg instead exposes another agenda: that many put their faith in science as the sole source of knowledge precisely because they do want to rule out spiritual entities, and that the fear of this drives much modern materialism. And the consequences of our beliefs affect how we conduct our lives, and the kind of world we believe in.

It is unfortunate that Trigg suggests that scientists may have to resort to methodological naturalism (page 27), i.e. conduct our experimental science as if nature were all there is. This should never be necessary! There is no reason why we should be methodologically identical to those whose whole premise (naturalism) is flawed. Furthermore, I believe that Christians are not lacking in methodological thinking. Methodological theism has been at the heart of the scientific revolution, inspiring the likes of Kepler, Newton, Boyle and Ray in their pioneering discoveries, laying the foundations of contemporary science. Methodological naturalism has taken what it likes from this and then rejected the theism. In other words, methodological naturalism has plagiarised methodological theism and adapted it to its own, godless worldview!

We must remember that in the battle for Origins we are dealing with philosophies, largely which can be traced back to the arena of the ancient Athenian Greeks. As a philosopher himself, but enlightened by the one who claims to be the Absolute Truth, Trigg provides some magnificent ammunition for these battles. His book is worthy of anyone's bookshelf … anyone who is engaged in such battles. ■

> editorial continued

This issue is about developing a critical mind. It is about recognising that evidence for evolution has no special or protected status and that it also needs to be appraised and evaluated. This is the significance of the site's analysis of the 'icons of evolution' mentioned above. There is another side to the story of Darwinism, and students rarely get the opportunity to examine the evidence with an open mind. If there is a hint that they are not persuaded by the data supplied in the textbook, they are accused of being fundamentalists, of closing their minds, and of abandoning science for superstition!

The DVDs sent to schools were produced by advocates of Intelligent Design (ID). This scholarly movement has blossomed in the US and elsewhere, and there are a growing number of scientists who affirm the following: "Intelligent design is the scientific investigation of patterns in nature that are best explained as the product of intelligence". They are convinced that the concept has real intellectual merit and deserves to be discussed fairly, openly, and vigorously at all levels of the society and culture. The DVDs seek to stimulate others to ask similar questions and to explore the merits of design explanations. (One of these DVDs has recently been reviewed in *Origins* 44 (5) by a PhD biochemist who has been involved in teaching the National Curriculum.)

The conclusion that ID advocates have come to is this. Materialist philosophy/ideology has subverted the study of biological and cosmological origins so that the actual content of these sciences has become corrupted. The problem, therefore, is not merely that science is being used illegitimately to promote a materialist worldview, but that this worldview is actively undermining scientific inquiry, leading to incorrect and unsupported conclusions about biological and cosmological origins. This is feeding back into education, but it has to be sustained by enforcing an uncritical receptiveness of the key ideas. Those who do not succumb are exposed to the fiercest of propaganda about believing "rubbish" or "deliberately embracing scientific ignorance".

It is this grotesque behaviour that all true educators will want to resist firmly. Our interests are in evidences and theories, arguments and counter-arguments. There is a legitimate case to be made against Darwinism and there is evidence supporting the design inference. The educational process is not served well by an ideological line that excludes such considerations from science. We want to see engagement with the arguments, not flag-waving about what is and is not science.

If the Government has any sense, it will not do anything to reinforce the grip that materialistic dogma has over many minds within the science community. We do not want to see any moves towards instituting 'thought police' to protect Darwinism from critical scrutiny, because that is self-evidently anti-science.

In correspondence about TiS with a Biology Professor from a respected US university, I received this comment: "How can rational persons object to this treatment? There are a few things I would add, but this is an excellent beginning for understanding the controversy." This is a good way to understand the TiS initiative. ■

David Tyler

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■ A timely quote from Tolstoy

Leo Tolstoy's last completed letter, dictated from his sick-bed at the Astapovo train station on November 1, 1910, six days before his death was addressed to his son Seryozha and daughter Tanya. It included a warning that Seryozha should not allow himself to be seduced by Darwinism!

> "The views you have acquired about Darwinism, evolution and the struggle for existence won't explain to you the meaning of your life and won't give you guidance in your actions, and a life without an explanation of its meaning and importance, and without the unfailing guidance that stems from it is a pitiful existence."

Tolstoy's Letters: Volume II, 1880-1910, selected, edited, and translated by R.F. Christian. London: Athlone Press, 1978; No. 607, p. 717.

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